The Mormon Fire was ignited by lightning on May 15th, 2016. Seasonal conditions on the Coconino N.F. had been significantly moderated by consistent spring rain and snowfall. This led to decreased fire intensity which provided the opportunity to successfully allow the Mormon Fire to achieve objectives outlined in the 1987 Land and Resource Management Plan.

Mormon Fire

Wildfire Outcome Report

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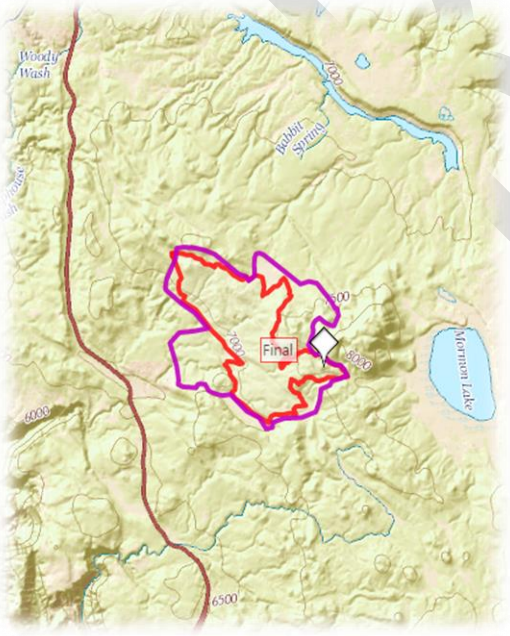
Coconino National Forest

Introduction

The Mormon Fire was ignited by lightning on May 15th, 2016. A WFDSS decision was drafted and published on May 16th, 2016 which outlined the objectives and courses of action for the Mormon fire. Seasonal conditions on the Coconino N.F. had been significantly moderated by consistent spring rain and snowfall. This led to decreased fire intensity which thus provided the opportunity to successfully allow the Mormon Fire to achieve objectives outlined in the 1987 Land and Resource Management Plan. A type 3 Incident Management Organization was built to implement management actions when the fire posed potential threat to the identified values at risk.

Photo 1: Photo of initial fire behavior on the Mormon Fire

Planning Area and Prioritized Value



Map 1: WFDSS capture of 14.149 acres planning area with the final perimeter of 7,884 acres.

In the initial stages of WFDSS planning, the Coconino National Forest developed an incident decision through an intent based, interdisciplinary approach. The process began with the development of a planning area that captured areas of anticipated wildfire impact, as well as, capturing adjacent areas of indirect affects and low probability event potential (Map 1) From this point, each resource specialist was given the opportunity to address their support/concerns and values within the planning area. This led to the creation of a list of incident "values at risk" which were then prioritized by the Agency Administrator to give the Incident Commander/Operations a clear picture of what is to be protected (Table 1). These values at risk are also included in every operations map (Appendix A)

Strategic and Incident Objectives/Outcomes

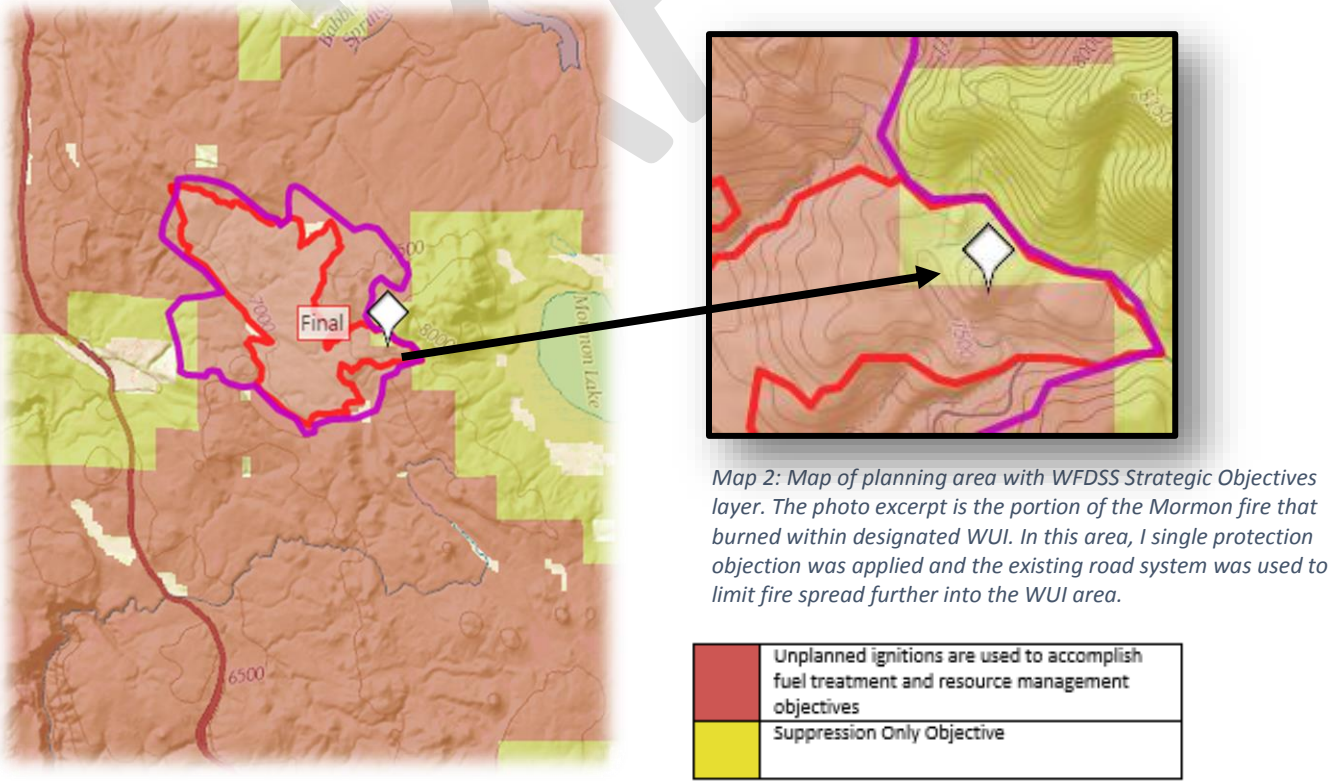
Table 1: List of prioritized values at risk developed at the WFDSS IDT Meeting on 5/16/2016

Prioritized Values at Risk	
1	Firefighter and Public Safety
2	Non FS Lands
3	Infrastructure – Comm Sites on Mormon Mtn
4	Ecosystem Process, Function, Health
4	4 FRI and FWPP Reference PACs – No Fire
5	Wildlife and MSO, PFAs
6	Cultural Resources
7	Structural Range Infrastructure
8	Recreation – Dispersed Recreation
9	Timber – Future Value

After the establishment of the planning area and prioritized values at risk, the Forest Strategic WFDSS Objectives and Management Requirements were reviewed. From these, incident specific objectives were developed to address the prioritized values at risk. Every incident specific objective developed, had an associated course of action that included a task, purpose, and endstate. This intent based planning process provides appropriate leader's intent and a clean transition from WFDSS to Delegation of Authority and IAP.

WFDSS Strategic Objectives

Per the 1987 Land Management Plan, "Unplanned ignitions are used to accomplish fuel treatment and resource objectives" in all areas with the exception of identified WUI (COF-LMP pg. 94, 137, 144, 147, 155, 157, 161, 165, 170, 182, 204*)*. On the Flagstaff District, WUI is identified by the Fire Management Unit (FMU01U) per Amendment 17 (pg. 137, 206-75). The planning area extends into the Suppression Only objective on the eastern and western ends (Map 2). These areas had single suppression (protection) objectives, and existing road systems were used to limit fire progression in the designated WUI areas.



Map 2: Map of planning area with WFDSS Strategic Objectives layer. The photo excerpt is the portion of the Mormon fire that burned within designated WUI. In this area, I single protection objection was applied and the existing road system was used to limit fire spread further into the WUI area.

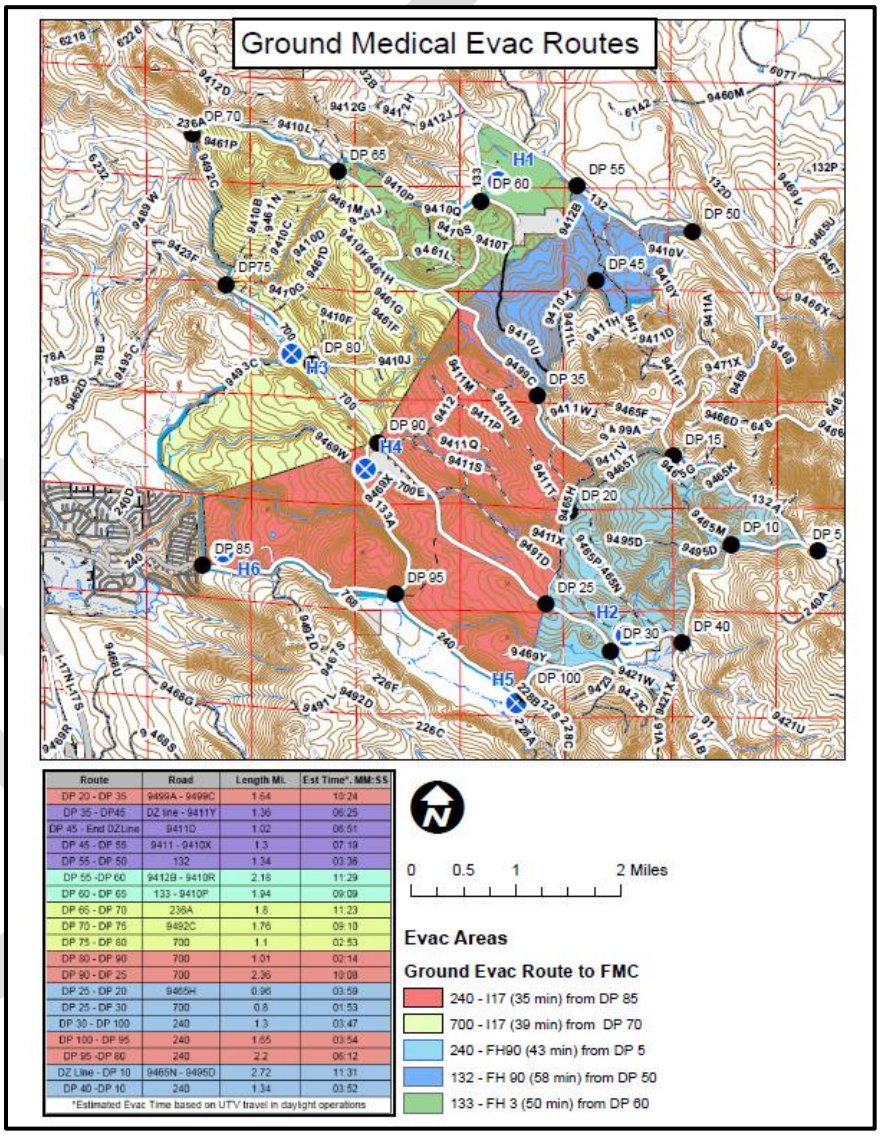
Incident Objectives/Outcomes

1 - Ensure the safety of all incident personnel.

This objective was achieved by using the risk management process, and by utilizing "life first" principals in decision making to minimize unnecessary risk and/or exposure. There were no major injuries reported during the Mormon Fire.

One measure employed to reduce risk was intent based planning into the incident planning process. This method gives clear leaders intent for every action in the ICS 204 through specific tasks, purposes, and endstate expected. Intent based planning starts with the WFDSS decision and is incorporated into the delegation of authority, incident objectives in the ICS 202 and again in the ICS 204s.

Another measure employed was the ordering of two line medics. These line medics spent time driving all possible evacuation routes. These routes where then mapped and timed. The result was attached directly to the ICS 206 in the IAP.



Route	Road	Length Mi.	Est Time*, MM:SS
DP 20 - DP 35	9499A - 9499C	1.64	10:24
DP 35 - DP45	DZ line - 9411Y	1.36	06:25
DP 45 - End DZLine	9411D	1.02	06:51
DP 45 - DP 55	9411 - 9410X	1.3	07:19
DP 55 - DP 50	132	1.34	03:36
DP 55 -DP 60	9412B - 9410R	2.18	11:29
DP 60 - DP 65	133 - 9410P	1.94	09:09
DP 65 - DP 70	236A	1.8	11:23
DP 70 - DP 75	9492C	1.76	09:10
DP 75 - DP 80	700	1.1	02:53
DP 80 - DP 90	700	1.01	02:14
DP 90 - DP 25	700	2.36	10:08
DP 25 - DP 20	9465H	0.96	03:59
DP 25 - DP 30	700	0.8	01:53
DP 30 - DP 100	240	1.3	03:47
DP 100 - DP 95	240	1.65	03:54
DP 95 -DP 80	240	2.2	06:12
DZ Line - DP 10	9465N - 9465D	2.72	11:31
DP 40 -DP 10	240	1.34	03:52

*Estimated Evac Time based on UTV travel in daylight operations

Map 3: Ground Medical Evacuation Route map developed by line medics on the Mormon Fire to provide a clear understanding of risk and exposure as it relates to medical evacuation.

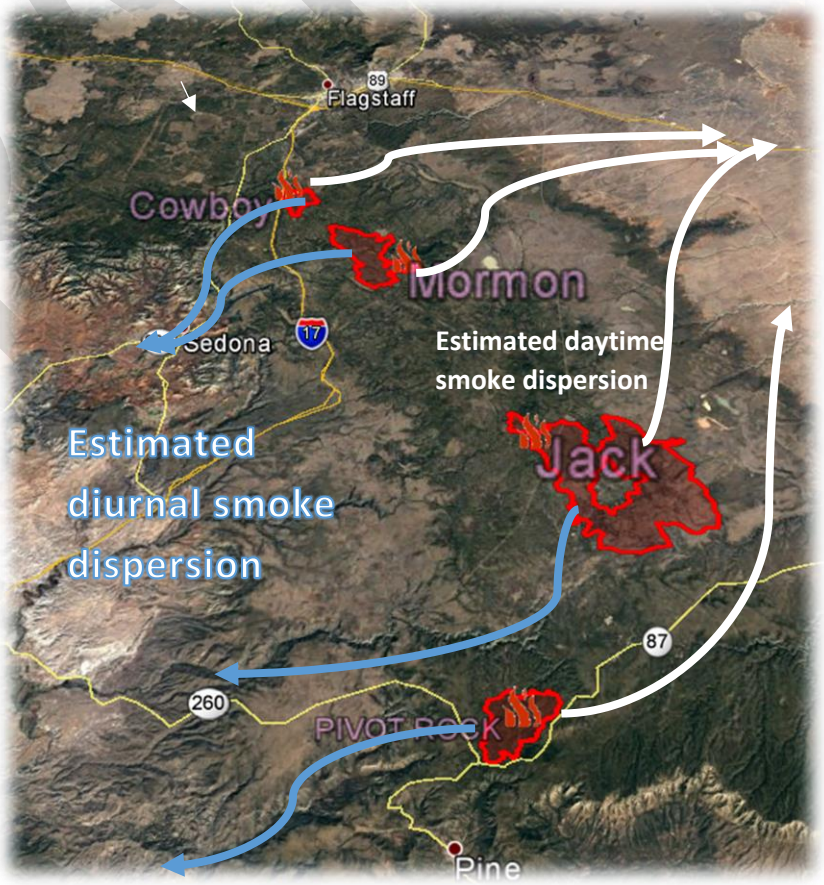
2 - Protect the public for the immediate fire area.

Public protection was achieved primarily through official area closures, by posting warning signage around the fire (soft closure), and by providing public notification of fire activity. This maximized the area avaiable for public entry and minimized impacts to dispersed recreation. Coordination occurred with the Cowboy fire pertaining to smoke production and resource needs. Additional signage and patrols along the major Forest roads were used to slow traffic speeds. As a result, no public were injured during the Mormon fire and the public did not impede on fire acticity or operations.

Photo 2: Sign developed by Agency Administrator to slow traffic within the fire to provide for extra public and firefighter safety.

3 - Minimize prolonged smoke impacts to firefighters, communities, observatory, and highways.

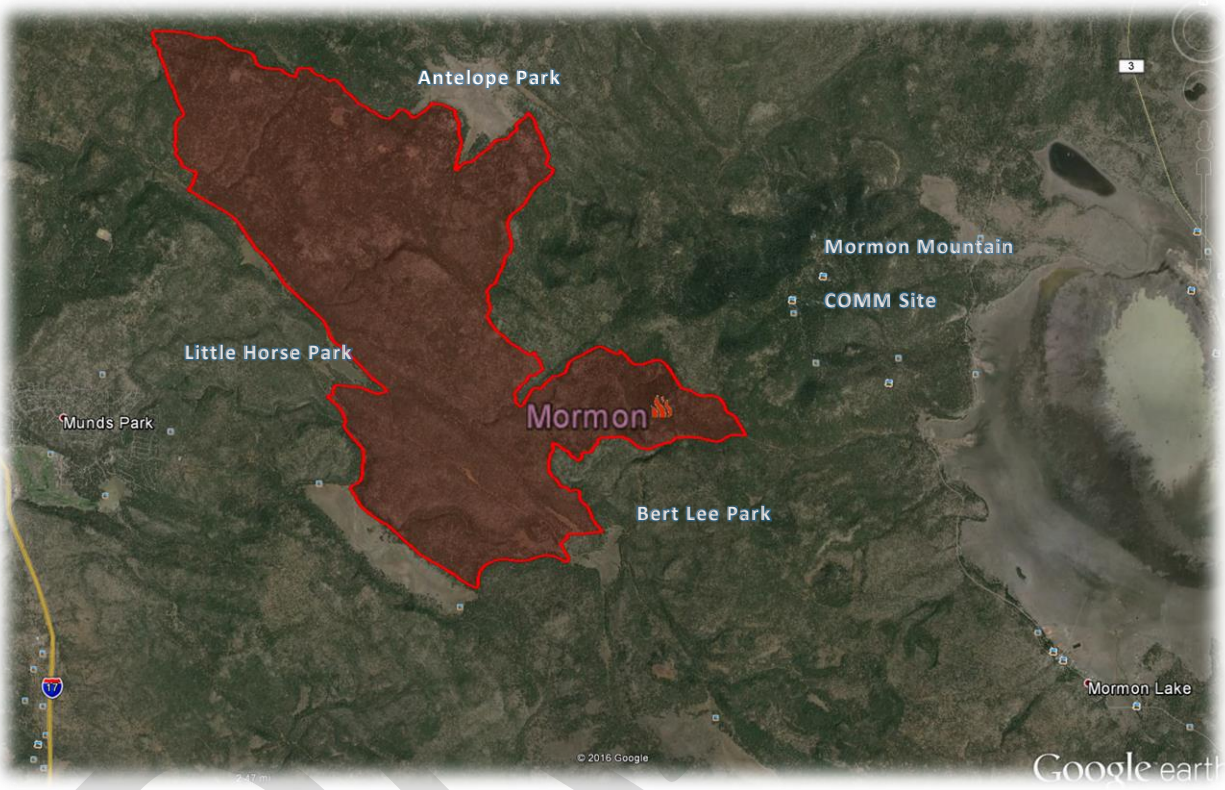
This objective was achieved; however, inconsistent weather predictions resulted in unexpected cumulative smoke from the Cowboy fire, Pivot Rock fire, Jack fire, and the Mormon fire led to impacts to surrounding communities and the City of Sedona. Fire managers attempted to shorten the duration of smoke impact by taking advantage of favorable weather and winds. This method was effective during daytime hours, but the diurnal impact was more severe than anticipated (Map 4).



Map 4: Estimated cumulative smoke dispersion during the Mormon Fire.

4 – Exclude fire from all private lands (North, South and East Newman Park).

This objective was achieved through the identification and implementation of point protection objectives. A combination of existing roads, established handline and dozerline was used to prep around all private lands. Ultimately, the fire did not reach the protection lines and no private land was burned.



Map 4: Map of private lands (Munds Park, Little Horse Park, Bert Lee Park, Antelope Park, and Mormon Mtn. COMM Site) excluded from the Mormon fire planning area. The fire provided additional future protection from uncharacteristic fire for these private lands.

In addition, the prioritized values at risk includes the high valued communication sites ontop of Mormon Mountain. These sites were identified as a high priority in terms of fire protection. During initial planning efforts, it was determined keep the fire south and west of Mormon Mountain due to MSO PAC monioring commitments, Flagstaff Watershed Protection Project NEPA, and communication towers. Future protection of the communication sites was achieved by reducing hazardous fuel loading to the southwest (predominate wind direction) of Mormon Mountain and the communication site.

5 – Maintain and develop partnerships and relationships with cooperators and stakeholders.

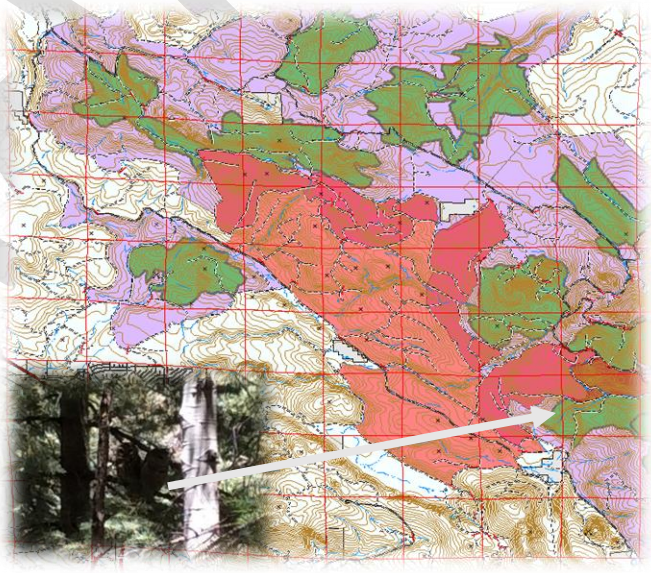
This objective was achieved through continuous communication and conversation with partners and stakeholders. All cooperators and stakeholders reacted positively towards the Mormon Fire with the exception of unforeseen smoke impacts in the City of Sedona and Village of Oak Creek.

6 – Provide timely and accurate public notification.

This objective was achieved through daily press releases, tweets, and InciWeb updates by our Forest Public Information Officers. In addition, the Forest ordered additional PIOs to help with public information and education. The focus was not only fire activity and information, but rather education and engagement of fire's role in the ecosystem as a disturbance and its ecological benefits.

7- Exclude fire from MSO PACs included in the 4FRI and FWPP monitoring plans

In order to achieve this objective, close coordination occurred between fire management and wildlife. Mexican Spotted Owl (MSO) PACs that were included within 4FRI and FWPP Monitoring PACs (Green Polygons – Map 5) were excluded from the area burned using existing road systems and established dozerline or handline. The PACs are set aside to determine different treatment impacts on MSOs as they pertain to long term landscape scale restoration efforts outlined in the 4 Forest Restoration Initiative (4FRI) and Flagstaff Watershed Protection Project (FWPP). During close coordination during the fires initial planning, U.S. Fish and Wildlife, in conjunction with Forest wildlife biologists, found a breeding pair of owls within the Bear Seep PAC on the southeastern side of the fires planning area. It was then determined to exclude the nest core of this PAC from the area allowed to burn and mitigate unintended impacts to the owls during breeding season.



Map 5: Map of the final Mormon fire perimeter (pink) and its relative juxtaposition to 4FRI and FWPP monitoring MSO PACs (green). The area in purple consists of a buffer area around established monitoring PACs. Within this buffer area, close coordination must occur with US Fish and Wildlife to determine the potential impact to MSOs within these monitoring areas. Photo is of a pair of MSO found in Bear Seep PAC, during coordination with wildlife and USFWS.

Photo 3: Photo stream of dozezline user to reopen old logging road and excluded fire from Bear Seep PAC

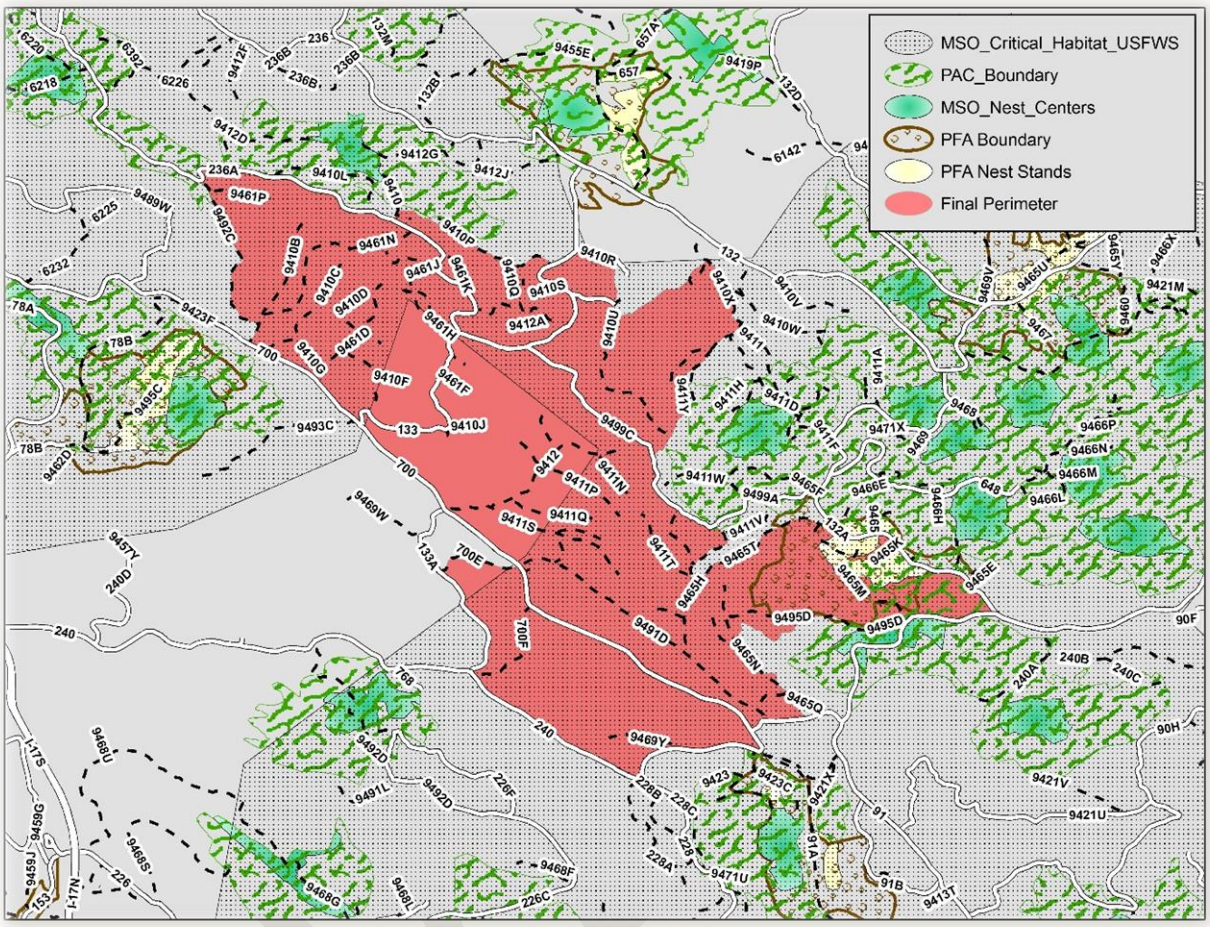
8 - Minimize negative impacts from fire and suppression activities within MSO PACs and PFAs

The objective was primarily achieved by excluding the majority of MSO PACs from the burned area. During field reconnaissance for the fire with USFWS, a discussion occurred about the feasibility of including a portion of the Bonita Tank PAC that was affected by the 2011 Bolt fire. The Bonita Tank PAC is part of the 4FRI Implementation Monitoring Plan and those acres have already been burned, while the other acres north of FR 236A have not been burned. Additionally, the inability to manage a road as owl habitat was also discussed. After a conversation with the 4FRI team, the Bonita Tank PAC was modified to exclude those acres south of FR 236A. This logic was also applied to the small number of acres in the Coulter Ridge PAC that were on the east side of FR 236A (Map 6).

Table 2: RAVG assessment of habitat impacts from fire severity.

Wildlife RAVG Analysis						
PAC		Unburned 0 BA loss	Very Low 1-25% BA Loss	Low 26-50% BA Loss	Moderate 51-75% BA Loss	High 75%+BA Loss
MSO PAC (Bear Seep)		0	217	63	4	0
	%	0%	76%	22%	1%	0%
N. Goshawk PFA		0	296	202	15	5
	%	0%	57%	39%	3%	1%
MSO Critical Habitat		3	2,472	3,857	155	25
	%	0%	38%	59%	2%	0%
Average	**Ac**	**1**	**995**	**1374**	**58**	**10**
Average	**%**	**0%**	**43%**	**30%**	**2%**	**0%**

Utilizing Rapid Assessment of Vegetation Condition after Wildfire (RAVG) assessments post fire, it was determined that negative impacts were indeed minimized during the Mormon fire. Bear Seep MSO PAC was the only PAC that experieced fire after wildlife and USFWS coordination. The PAC experience very low to low fire effects (Table 2). MSO Critical habitat covered the majority of the burned area. Only 25 acres of this area burned under high severity. About 518 of Northern Goshawk PFAs were impacted by the Mormon Fire with 1% high severity. Overall, there Mormon fire experienced more possitive fire severity and minimal negative.



Map 6: Map of wildlife habitat designations in the vicinity of the Mormon Fire. Habitat designations include MSO Critical Habitat, MSO PACs, Northern Goshawk PFAs.

9 – Protect cultural resources, aspen exclosures, and structural range improvements

This objective was achieved through direct coordination with the Resource Advisor (READ), as well as, identification and point protection measures employed for each identified value. All prioritized values at risk are identified on the operations maps. All identified values were protected and/or repaired (Appendix A – Ops Map). The fire never reached the identified aspen exclosures (Photo 4). It was determined that if there was an opportunity, fire would be allow to burn through the exclosures to promote regeneration.

Photo 4: Photo of dilapidated aspen stand within an identified aspen exclosure. Unfortunately, fire never reached this area.

10 - Maintain a healthy ecosystem by reintroducing natural fire back into the forest.

This is the primary objective for fuel reduction and forest health. A portion of the Mormon fire has experienced past fire (1,790 acres or 23%). A large portion of this area consisted of the 2011 Bolt fire that was also used to achieve multiple land management objectives. This provided the Mormon fire a unique opportunity to revisit a previously burned area with its natural fire regime timeframe (5 years). With the 2011 Bolt fire burn area, the Mormon fire was effective in removing a portion of the downed dead wood, resulting from burn mortality in 2011. The remainder of the general area was highly departed from historical conditions, and was experiencing overstocking and reduced understory biodiversity. These are the primary reasons that the Mormon fire was considered as a candidate for meeting Land Management and resource objectives. As the fire burned (from 5/17 to 6/4) fire managers employed a series of ground and aerial management ignitions and protection measure tactics to moderate fire behavior and achieve the incident objectives. The table below breaks out the fire affects assessed by RAVG (Rapid Assessment of Vegetation Conditions after Wildfire) data by veg type (Appendix A – RAVG Map).

Table 3: RAVG analysis of vegetation effects from fire severity on the Mormon fire.

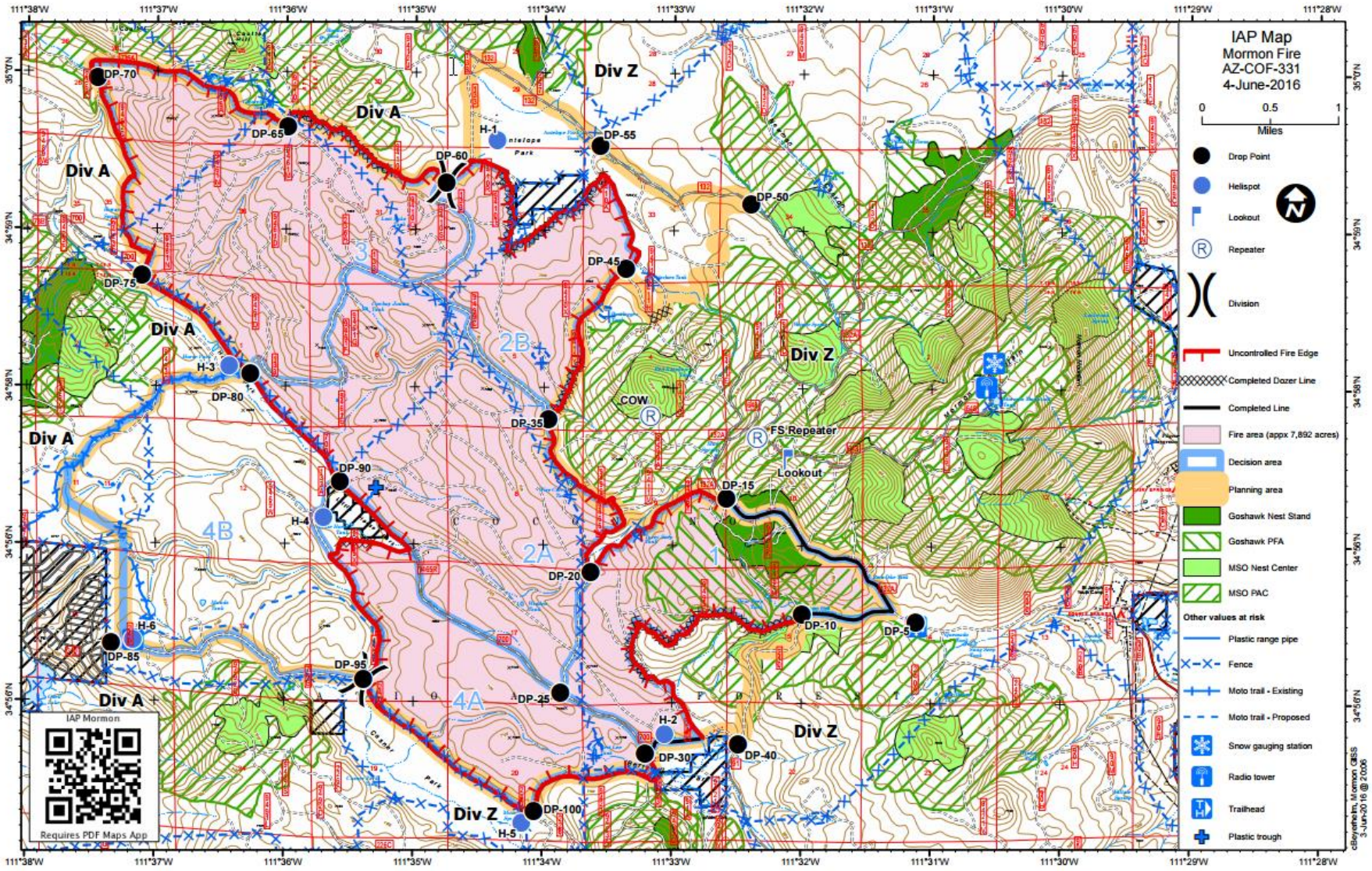
Vegetation RAVG Analysis					
Veg Type	**Unburned 0 BA loss**	**Very Low 1-25% BA Loss**	**Low 26-50% BA Loss**	**Moderate 51-75% BA Loss**	**High 75%+BA Loss**
Ponderosa Pine (7,717 acres)	4	2,552	4,768	329	54
%	0%	33%	62%	4%	1%
Great Basin Grasslands (2,971 acres)	5	55	91	3	0
%	3%	36%	59%	2%	0%
Average Ac	**5**	**1,304**	**2,430**	**166**	**27**
Average %	**2%**	**35%**	**61%**	**3%**	**1%**

Based on the table above, about 1% of the area burned under high severity (75+% BA Loss) with largest patch size almost 10 acres. The largest percentage was in the low severity category (25-50% BA Loss) which is consistent with objective 10 (See Appendix B for Task, Purpose Endstate WFDSS Courses of Action associated with the Incident Objectives).

9 – Minimize the introduction and spread of non-native and invasive plant species.

This objective was achieved by cleaning equipment to the extent possible throughout the life of the fire. This limited the spread of known non-native and invasive plant species. Known populations of non-native or invasive plant species were avoided.

Appendix A: Ops Map (6/4)



Appendix B: Task Purpose Endstate for WFDSS

Prioritized Values at Risk	
1	Firefighter and Public Safety
2	Non FS Lands
3	Infrastructure – Comm Sites on Mormon Mtn
4	Ecosystem Process, Function, Health
4	4 FRI and FWPP Reference PACs – No Fire
5	Wildlife and MSO, PFAs
6	Cultural Resources
7	Structural Range Infrastructure
8	Recreation – Dispersed Recreation
9	Timber – Future Value

Incident Objectives for the Mormon Fire

1) Ensure the safety of all incident personnel
2) Protect the public for the immediate fire area
3) Minimize prolonged smoke impacts to firefighters, communities, observatory, and highways.
4) Exclude fire from private lands.
5) Maintain and develop partnerships and relationships with cooperators and stakeholders,
6) Provide timely and accurate public information
7) Exclude fire from MSO PACs included in the 4FRI and FWPP monitoring plans
8) Minimize impacts from fire and suppression activities within spotted owl PACs and northern goshawk PFA's.
9) Protect cultural resources, aspen exclosures, structural range improvements
   Incident Requirement – Survey in advance of any dozerline contruction.
10) To maintain a healthy ecosystem by reintroducing natural fire back into the forest
11) Minimize the introduction and spread on non-native and invasive plant species

Mormon Fire Courses of Action (Task, Purpose Endstate)

1	**Task:** Use the risk management process to make safe and efficient operational and planning decisions. **Purpose:** to minimize unnecessary risk and exposure. **Endstate:** Everyone returned home safe with no major injuries.
2	**Task:** by maintaining closures as needed and posting appropriate warning signage in the planning area. **Purpose:** to keep public informed and out of the active fire area **Endstate:** Public was well informed and did not impinge on fire operations.
3	**Task:** Utilize timely and properly scaled low intensity firing techniques and take advantage of favorable weather conditions. **Purpose:** To minimize heavy smoke impacts to smoke receptors. **Endstate:** Duration of smoke impacts was minimized throughout life span of the fire.
4	**Task:** Use appropriate suppression actions on any part of the fire that threatens life and property. **Purpose:** To protect the residents and structures on private lands. **Endstate:** No private land burned

5	**Task:** provide timely updates on fire conditions and future plans. Engage cooperators and stakeholders in discussions related to the values at risk and other areas of concern. **Purpose:** Engage partners, cooperators, and stakeholders throughout the duration of the fire. To continue to build shared ownership and objectives for fire management. **Endstate:** Partners, cooperators and stakeholder expressed satisfaction with the management of the fire and their level of involvement.
6	**Task:** media releases and information to hikers, campers and tourists. Keep InciWeb updated. **Purpose:** proactively keep public informed **Endstate:** Public was well informed of fire activity and impacts
7	**Task:** Use suppression actions to exclude fire from PACs within the FRI and FWPP monitoring plans **Purpose:** To protect PACs for future management activity and comparison. **Endstate:** No fire entered Bonita Tank, Crawdad, Red Raspberry and Mayflower Tank PACs.
8	**Task:** • Work closely with Forest/District resource Advisor to ensure that sensitive resource objectives are considered during fire suppression activities. i.e. be aware of TES locations. • When possible/feasible, use tactics that help protect the loss of snags, avoid the removal of interior snags if they do not pose a safety issue to firefighters or public. **Purpose:** To protect Mexican Spotted owls and Northern Goshawk habitat, ensure low to moderate fire effects within owl PACs and Goshawk PFAs and critical habitat. **Endstate:** MSO PACs and Goshawk PFAs were protected and habitat was enhanced.
9	**Task:** Use appropriate point protection and fire suppression actions to minimize impacts. **Purpose:** To protect resource values at risk **Endstate:** Negative impacts to values and risk were minimized and fire effects provided future resource protection.
10	**Task:** Allow low intensity wildfire to play its natural role in the ecosystem to the degree possible given the prioritized values as risk. **Purpose:** To restore fire as a natural disturbance on the landscape. **Endstate:** Mortality of trees greater than 9in dbh was less than 10% of the burned area. Stand replacing patches did not exceed 4 acres.